

GeoMax

GNSS

FAQ Sheet

V 2.7

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1 GNSS - General

1.1 What is BeiDou?

BeiDou is the Chinese GNSS system, equivalent to GLONASS and GPS. By 2020 it is planned to have 35 BeiDou satellites in orbit.

1.2 What is Galileo?

Galileo is the European GNSS system, equivalent to GLONASS, GPS and BeiDou. By 2020 it is planned to **have 30 BeiDou satellites** in orbit (final stage)

1.3 What benefit do I have through BeiDou & Galileo?

With the recent launches of Galileo satellites, the European GNSS already today offers significant benefits in combination with the other satellite systems. In multipath environment the positioning accuracy significantly enhances while under canopy, the availability improves. Consequently, more benefits can be expected with each satellite launch until 2020 when Galileo is scheduled to be fully operational.

For more information, please see the following article:

<http://gpsworld.com/how-galileo-benefits-high-precision-rtk/>

1.4 To what level BeiDou & Galileo are supported?

GNSS	Tracking	Positioning	GGO Post processing
Zenith15	-	-	-
Zenith25 Pro	BeiDou & Galileo	BeiDou & Galileo	-
Zenith35	BeiDou & Galileo	BeiDou & Galileo	-
Zenith35 Pro	BeiDou & Galileo	BeiDou & Galileo	-

1.5 Can GeoMax receivers be used on a machine for Machine control use cases?

No, the GeoMax Zenith GNSS receivers are not intended to be mounted on machines. Even though they resist certain vibrations and are specified accordingly, they do clearly not meet the requirements for such machine control use cases.

1.6 Base-Rover Setup: Do I need GLONASS/BeiDou/Galileo installed on both receivers?

Yes, in order to make use of GLONASS/BeiDou/Galileo satellites, both receivers, means Base and Rover need to have the option installed.

1.7 Why is the displayed CQ value of VRS sometimes better than MAX?

VRS works by creating a "Virtual Reference Station" that is very close to the rover (Approximately 2m) and produces RTK corrections based on that location. All the rover receives from the network is the location of the virtual reference station and the corresponding RTK corrections. The rover only knows the baseline length between the virtual reference station and itself and does not know anything about the true baseline lengths between the base stations in the network. NovAtel's RTK CQ is based on the baseline length and since the baseline length between the virtual reference station and the rover is so small, the resulting CQ is optimistic. This is caused by limitations in the VRS network method and is out of NovAtel's control.

2 Zenith10/20

2.1 Can I use an external 3G modem?

The GSM modem in the Zenith receiver is a 2G modem and not compatible with all cellular networks. If the internal modem does not support the local network, then a controller with a 3G or higher modem can be used. When using an external modem, the controller must be connected to the Zenith receiver with 797023 ZDC227 Lemo-to-RS232 serial cable. The RTK messages are then transferred to the receiver by this cable. The field software extracts the computed positions from the Zenith as usual by Bluetooth.

2.2 Base-Rover Setup: Do I need GLONASS installed on both receivers?

Yes, in order to make use of GLONASS satellites, both receivers, means Base and Rover need to have the GLONASS option installed

2.3 Does Zenith10/20 support "Satellite Based Augmentation Systems" SBAS?

Yes, the receiver fully supports it. However, in order to make use of it the Field Software must also support SBAS.

2.4 How can I see that SBAS works?

SBAS satellites do not send out a message about their position in the sky – so it is not possible to see the satellites in the skyplot, typically provided in the field software. To verify SBAS best is to enable SBAS in the field software and take some measurements without making use of any other RTK data. SBAS is used when you get DGPS positioning accuracy, visible in the field software.

2.5 Is BeiDou available for Zenith10 and Zenith20?

No, due to the limited channels of Zenith10, BeiDou is only available for Zenith20.

2.6 From which S.No. NMEA Out via Cable works?

At Zenith20 from GMZ203B20001 onwards NMEA via cable is supported by the board. They are produced from mid of December 2013 onwards.

3 Zenith15/25

3.1 Zenith15/25 Common

3.1.1 Does Zenith15/25 support the RTCM transformation message?

Yes, the antenna does handle it. However keep in mind that the Field Software (e.g. Field Genius, XPAD, SurvCE) must support this RTCM message as well.

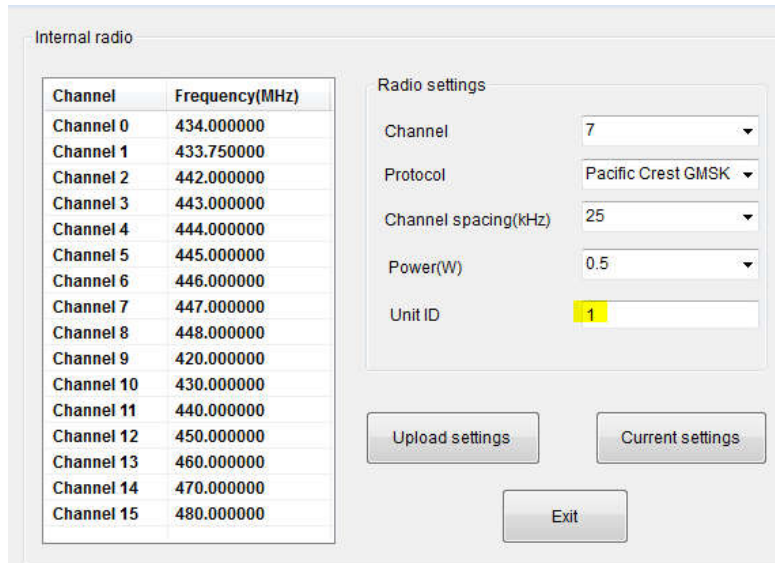
3.1.2 Do you have more details about the Net-weight of different versions?

The receiver's net weight without battery and SIM- and SD card is as following:

Z25-GSM: 1.075 kg
Z25-UHF: 1.100 kg

3.1.3 Why Zenith15/25 base and rover does not communicate when using Pacific Crest GMSK protocol?

When using Pacific Crest GMSK protocol between Zenith25 base and Zenith25 rover, the **Unit ID** must be set to a different number on both sensors. This number can be changed in GeoMax Assistant -> Radio Settings panel -> Unit ID field. A different number has to be set on the base and on the rover unit prior to the observations. Please see the attached screenshot, which shows the location of the Unit ID:

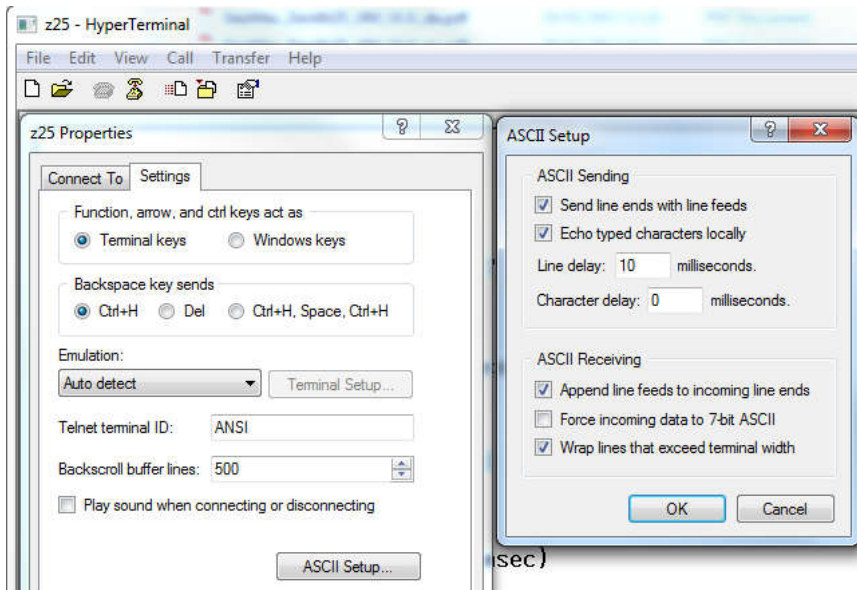


Please note, that using the Trimtalk protocol does not require the Unit ID to be changed. When selecting the Trimtalk protocol, this field is greyed out.

3.1.4 How can I switch the Zenith15/25 on or off remotely?

It is possible to control the switching on/off of the receiver via the Lemo port by connecting to a PC with the ZDC223 USB cable. On the PC, run a terminal emulation software such as HyperTerminal.

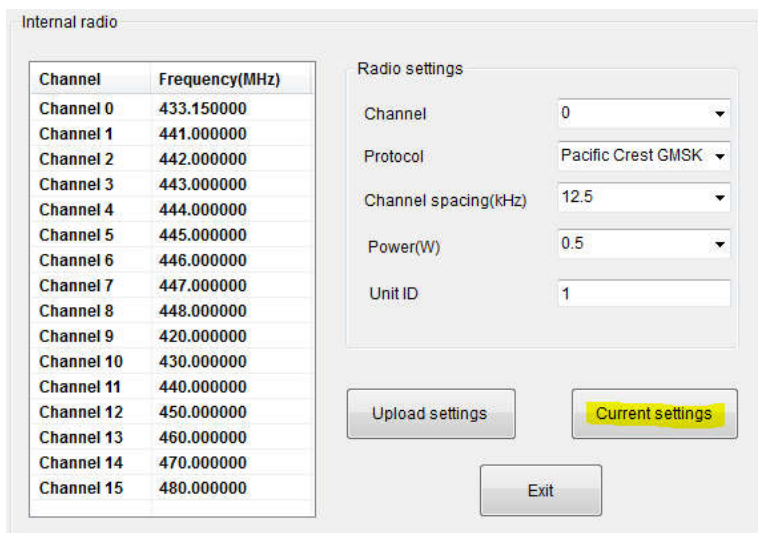
With the terminal software, choose the COM port that is assigned to the USB cable. Ensure that the software allows the entering of text fields. For HyperTerminal this is set at the "Properties/Settings/ASCII-Setup" window. Ensure that the "Send line ends with line feeds" and "Echo typed characters locally" are ticked as shown in the screenshot:



- Make a connection to the COM port of the cable.
- To switch on the receiver, send the characters: **PWR**
- To switch off the receiver, send the characters: **\$PLEIS,PWR,0*26**

3.1.5 How do I check the radio settings of my Zenith15/25 receiver?

When starting Zenith25 GeoMax Assistant, the values shown in the radio settings window are those that were previously edited and not those of the receiver. To view the configured values stored in the receiver, click "Current Settings" (see the screenshot below). The values displayed in the settings window are then updated to those set in the receiver.



3.1.6 Can I use an external 3G modem?

The GSM modem in the Zenith25 (non "Pro" models) receiver is a 2G modem and not compatible with all cellular networks. Zenith25 Pro models are equipped with an internal 3.75 G GSM which should be supported by all networks

If the internal modem does not support the local network, then a controller with a 3G or higher modem can be used. When using an external modem, the controller must be connected to the Zenith25 receiver with 797023 ZDC227 Lemo-to-RS232 serial cable.

The RTK messages are then transferred to the receiver by this cable. The field software extracts the computed positions from the Zenith25 as usual by Bluetooth.

3.1.7 Does Zenith25 support "Satellite Based Augmentation Systems" SBAS?

Yes, the receiver fully supports it. However, in order to make use of it the Field Software must also support the configuration and enabling of SBAS.

3.1.8 How can I see that SBAS works?

SBAS satellites do not send out a message about their position in the sky – so it is not possible to see the satellites in the skyplot, typically provided in the field software. To verify SBAS best is to enable SBAS in the field software and take some measurements without making use of any other RTK data. SBAS is used when you get DGPS positioning accuracy, visible in the field software.

3.1.9 Why GeoMax Assistant shows a fail (F) message for the GSM module?

GeoMax Assistant is not able to communicate with the GSM module if it currently configured for use with a field software. Before connecting the receiver to a PC, it must be ensured that it has been appropriately disconnected from the handheld device. For example, with FieldGenius this is done using the "Prepare for GeoMax Assistant" button, followed by "Instrument Disconnect" in the Instrument Settings menu.

3.1.10 How is NMEA output configured and what rates are available?

The NMEA output can only be configured by suitable field software and not by GeoMax Assistant. NMEA output messages can be configured at rates between 60 sec and 1 sec.

3.1.11 Raw data transfer by cable crashes - what is the reason?

At large file sizes, or when selecting many files, the transfer of raw data by cable with GeoMax Assistant takes a very long time (several hours). It could happen that the transfer is not successful. Therefore at large file sizes it is recommended to copy the raw data directly from the SD card to the PC by using a SD card reader.

3.1.12 Why do I have a height offset when working with a UHF setup?

Please make sure your base antenna is supported in the antenna management of the Zenith15/25. Please refer to the Zenith15/25 Installation Guide V3.0 which can be downloaded in the Partner Area.

3.1.13 What can I do when I do not track satellites?

Please, make a '1 second reset' pressing and holding the ON/OFF and the FUNCTION button at the same time for 1s (the position LED flashes red 3 times). When the lights are on again, make a '10 second reset' pressing the ON/OFF and the FUNCTION button at the same time for 10s. With these resets the almanacs and the configured settings will be deleted.

3.1.14 *Can I connect to the configured RTK base station or NTRIP without configuring the device again?*

Yes, it is possible to receive the signals from the configured base station/NTRIP server when the Zenith15/25 is in rover mode just pressing the FUNCTION button for 5 seconds. The RTK rover LED flashes for 2 seconds.

3.2 Zenith15 Specific

3.2.1 *What are the differences between Zenith15 and Zenith25Pro?*

The Zenith15 differs from Zenith25 mainly by the supported satellite systems and the accuracy. For further details, please refer to the GeoMax Positioning ppt.

3.2.2 *Why is the accuracy of Zenith15 lower than Zenith25 Pro?*

The Zenith15 differs to Zenith25 Pro by using cost optimized components, that provide an accuracy as specified.

3.2.3 *Can I upgrade my Zenith15 at later point to BeiDou?*

No, the hardware used in Zenith15 does not support BeiDou.

3.2.4 *Will the new Zenith15 replace any existing models?*

Yes, Zenith15 will replace Zenith10/20 GNSS.

3.2.5 *Does Zenith15 have a built in 2G or 3G GSM modem?*

Zenith15 has a 3.75 G modem built-in.

3.2.6 *Will I be able to log RINEX3 data on my Zenith15 receiver?*

Yes, RINEX3 logging is available for the Zenith15.

3.2.7 *Can I upgrade my Zenith15 to a Zenith25 Pro?*

No this is not possible.

3.3 Zenith25 Pro specific

3.3.1 *For what does the "4" stands for at some Zenith25 Pro models?*

The Zenith25 Pro-4 models are capable to track the four major GNSS systems – GPS, GLONASS, BeiDou and Galileo.

3.3.2 *Why isn't there an option for GLONASS & BeiDou to order for Zenith25 Pro?*

The GLONASS license is preloaded to all Zenith25 Pro, while the BeiDou license is loaded to Zenith25 Pro-4 receivers.

3.3.3 *Do you have more details to battery lifetime?*

Yes, please see the following operating times that can be achieved with brand-new GeoMax ZBA201

SPP	7:30 h
NTRIP	5:15 h

UHF RX (0.5 W mode): 5:00 h
UHF TX (0.5 W mode): 5:00 h (Base)
UHF RX (1 W mode): 4:00 h
UHF TX (1 W mode): 4:00 h (Base)

3.3.4 *Has the firmware V2.60 improved with regards of positioning?*

Yes, in the previous version at least 4 GPS satellites were required for position calculation. In the new firmware V2.60 a minimum of 4 satellites from a single satellite system (GPS, Glonass or BeiDou) is required for position calculations, or 3+2 satellite combination from any satellite system (for example 3GPS+2Glonass, or 3GPS+2BeiDou..). This improvement increases the position availability in difficult conditions or areas with less GPS visibility.

4 Zenith35 / Zenith35 Pro

4.1 **What are the operating times in various modes?**

Base: Static mode: 6h 00 min
Base: UHF mode: 4h 20 min
Rover: UHF mode: 4h 53 min
Rover: NTRIP mode: 5h 20 min
Rover: UHF mode: 5h 06 min

4.2 **What Browsers are supported to access the Z35WebManager?**

All most common browsers are supported. These are:

- Microsoft Internet Explorer
- Google Chrome
- Mozilla Firefox
- Apple Safari

4.3 **What happens if the Z35WebManager password has been lost?**

The user can change the default password (*User name: admin Password: password*) within the GeoMax Z35WebManager. If the user defined password is lost, please contact: GeoMax Support

4.4 **What happens if SD card is selected as memory device and no SD card is inserted?**

If no SD Card is inserted, the user has selected SD card as memory device and is logging raw data, the internal memory will take over and store the files.

4.5 **What are the costs for DynDNS to remotely access the GNSS antenna**

The costs for DynDNS are approximately 40 USD per year.

4.6 **Although we have as a maximum 10 user for DynDNS access, less Rovers can receive RTK-data.**

10 users are the technical maximum. The number of users is actually depending on the location, network, signal strength within particular cell, UMTS, 3G, 4G....

4.7 Which memory device is the Storage LED reflecting?

The storage LED reflects the memory which is the preferred and selected one. If the internal memory is the active one, the internal memory is reflected by the Storage LED. The same is valid if the SD card is the active memory device.

4.8 What happens if the SD card is the active memory, but no physical SD card is inserted in the antenna and I am logging data?

If the SD card is the active memory device, but no SD card is inserted, the active memory becomes the internal memory. This ensures no data is lost although the user missed to insert a SD card. In this case the internal memory is the backup.

4.9 If I have purchased GPS L5 option – do I also receive SBAS L5 signals?

Yes.

4.10 Why is my SIM card not working when configuring the Zenith35 with the GeoMax Z35WebManager?

Please make sure the PIN code of your SIM card is disabled or the username and code are correct. Please also make sure the GSM antenna is mounted correctly.

4.11 Do I need a special SIM card in order to be able to use DynDNS?

In order to be able to use your SIM card for DynDNS in Base mode, your provider needs to enable this by providing an Access Point Number (APN) together with a range of open ports, which can be used for this use case. If you are not sure, please contact your provider and ask for the current status of your SIM card. If you want to use DynDNS in Rover mode no special SIM card is required.

4.12 Why don't I lose the fixed position after RTK reset?

When the user resets the RTK, the processing kernel re-calculates the ambiguities, while maintaining the current position solution type till a Loss of Lock (LoL) occurs. Once there is a loss of lock, then the processing kernel will use the newly calculated ambiguities. This is why the position solution type doesn't change after the RTK reset.

4.13 Why don't I lose the fixed position after changing from "Normal" to "Extra Safe" mode?

When changing from "Normal" to "Extra Safe" mode the ambiguity filter will not be reset. Additional more stringent tests will be carried out for the verification of the ambiguity set. This doesn't require a position solution change.

4.14 Why does the SUM of all satellites stay the same as in "Navigated" solution after a "Phase fixed" position is achieved?

NovAtel is using the extrapolated solution, which makes use of all satellites on the rover to compute the high rate solution the best it can. Therefore, the SUM of all satellites after a Phase fixed solution is achieved reflects all satellites tracked at the particular epoch.

4.15 Why do I see the same Correction format type on the rover after I change it on the base while using UHF?

The Correction format type transmitted by the base is picked up automatically by the rover. If the correction format is changed on the base (for example from RTCM3 to

CMR), then the rover will still show the previous correction type. The base needs to be stopped and started manually in order for the rover to recognize the change in the transmitted correction format type.

4.16 Why don't I see the SBAS satellites in the sky plot?

The sky plot is using a NMEA string to plot the elevation and azimuth of the satellites. The string contains information only for GPS, Glonass and BeiDou satellites, and not for SBAS. Therefore, the SBAS satellites are not plotted in the sky plot.

4.17 Which UHF protocol I need to set when using Zenith35 as base and Zenith25 Pro as rover?

You need to set on base and rover the "PCC-GMSK" UHF protocol.

4.18 How do I upload/update the antenna management file on my receiver?

Download the latest antenna management file from the GeoMax website (<http://www.geomax-positioning.com/downloads.htm?cid=16094>) . Then store the file and upload it to your antenna with the GeoMax Z35WebManager.

4.19 Is it possible to log RINEX2.11 directly onboard of the Zenith35?

Yes, from onboard version 1.10 onwards it is possible to log RINEX version 2.11 directly onboard of the Zenith35. However, it is recommended to use RINEX 3.02 logging on Zenith35, since it also supports the BeiDou satellites and it is the up-to-date RINEX version.

4.20 Why does the self-test result fail, when each result passes?

During self-test a check for TAG (INS) is performed. If the unit has no TAG sensor, then this test will return an error message, causing the whole test result showed as "FAIL". In the future sensors with TAG and without TAG will be differentiated during self-test.

4.21 Why is a re-/calibration of the tilt sensor needed?

The calibration is needed to adjust and align the accelerometers with the local gravity field.

4.22 How does the user do a calibration and what does he need to consider?

The user needs to make sure the pole is centered. This means, that the pole needs to be stable with the physical bubble inside the circle. For a better (more precise) calibration, the user will even need to use a tribrach to calibrate. As the calibration is a "click to reset" mechanism, the user must ensure to perform this calibration correctly, otherwise he/she may get wrong results.

4.23 When a re-calibration of the tilt sensor in Zenith35 TAG is recommended?

We recommend re-calibrating the Zenith35 TAG if..

- a) Zenith35 is used within an area of significantly changed gravity conditions (e.g. in mountains)
- b) Current temperature differs by about 25-30 °C from the last calibration
- c) After mechanical stress like shock/vibration/drop/topple over

4.24 What happens, if I do not recalibrate the tilt?

The accuracy of the tilt measurement and the subsequent calculations will decrease.

4.25 Are there recommendations for doing the calibration?

It is suggested to follow the recommendations in order to achieve the maximum accuracy:

- Make sure that the reference bubble, located on the pole is calibrated precisely and centered
- Make sure the pole is in good condition: it is straight and not bended
- Use the same pole for the standard measurements, as the one used for calibration
- Make sure that the receiver is as stable as possible during the calibration process. Consider using a bipod (ZST100; Art.No 765616)

4.26 Is the tilt sensor influenced by electromagnetic fields?

The influence is marginal; thus, it can be neglected for GNSS applications.

4.27 What is the accuracy of the tilt sensor itself?

The accuracy of the sensor is 0.1 degree.

4.28 What is the output frequency of the tilt values?

By default, the tilt values (pitch & roll) are output with 5 Hz. The final update rate is depending on the field software you are using and is not linked to the GNSS update rate.

4.29 What benefit do I have by purchasing the Tilt&Go model?

The benefits depend on the field software used. In general, the Tilt&Go functionality could deliver the following benefits:

- Measurement of inaccessible points: By measuring a point in two tilted positions, the field software can calculate the "hidden" point by an intersection. → "Cone Pole" solution.
- Electronic bubble: The implemented tilt sensor enables to display a very precise electronic bubble which improves the centering accuracy.
- Auto Points: the electronic bubble can be used by the field software to define thresholds for collecting auto points. This ensures that only points, which are meeting the accuracy limit, are stored.
- Quality documentation: By storing the tilt information to each GNSS measurement, you can easily document your survey work.

4.30 What is the maximum inclination of the tilt sensor?

It is recommended not to tilt more than about 30°, since the satellites signals might be biased within the receiver when tilted more.

4.31 If I am using the "2-points"-application to determine an inaccessible point – what is the best constellation?

You will get the best result for the calculation of the inaccessible point, if you have used an angle of intersection of about 90°.

4.32 When moving the pole, the electronic and physical bubbles do not move in the same direction?

Please note that to operate the electronic bubble, the control panel and the controller must be aligned and facing the operator.

4.33 Why is the displayed CQ value of the Zenith25 Pro closer to the true measured accuracy than the one shown on the Zenith35/Pro?

The Zenith25 Pro uses a different and more advanced RTK algorithm for determining the CQ value.

4.34 How many GPS and/or GLO satellites do I need to obtain a fixed ambiguity solution?

4 GPS and 2 GLO satellites are the very minimum needed for RTK position. Please note this is reflecting the minimum in good conditions. In case of worse conditions such as canopy, trees or skyscrapers, the minimum constellation can increase.

4.35 Which RTK protocols are supported?

- When Zenith35 Pro works as base, it supports: RTCM2.3, RTCM3.0, RTCM3.2 MSM and CMR/CMR+.
- When Zenith35 Pro works as rover, it supports: RTCM2.1, RTCM2.3, RTCM3.0, RTCM3.1, RTCM3.2 MSM and CMR/CMR+.

4.36 Is there a Zenith35 Pro (non TAG) version available with 20 Hz?

No, this model has been phased out.

847 646 Zenith35 Pro GSM-UHF-TAG, 20 Hz will remain in the portfolio restricted to distinct applications and tender business – special pricing rules and limitations on availability is applied.

In such cases, please contact your local dealer manager for advice.

4.37 Did you change to a new OEM7 board as it has only 5 Hz pos.-rate?

No, the OEM7 board itself did not change- we still use OEM719 board, however in a different configuration.

4.38 Can I upgrade my Zenith35 Pro 5 Hz receivers to 20 Hz?

No, the new Zenith35 Pro GNSS receivers (871617 and 871618) cannot be upgraded to 20 Hz – neither at ordering process nor at later stage.

5 Zenith40

5.1 How does PPP work?

Please visit the TerraStar website for detailed information:

<https://www.novatel.com/products/terraStar-gnss-corrections/#overview>

5.2 Which TerraStar service are you using?

For surveying purposes, it is recommended to use TerraStar C Pro.

For more details, please visit:

- <https://www.novatel.com/about-us/news-releases/news-releases-2018/terrastar-c-pro/>
- <https://www.novatel.com/products/terrastar-gnss-corrections/#contentTab1>

5.3 Can I buy the TerraStar subscription at GeoMax?

No, the TerraStar service must be ordered at the local TerraStar dealer

<https://www.novatel.com/where-to-buy/dealers/>

In addition, GeoMax can grant access to the TerraStar e-shop. Please contact GeoMax Support.

5.4 Are other PPP Services such as ATLAS supported?

No, Zenith40 only supports TerraStar PPP/L-Band services

5.5 Can I upgrade my Zenith15/25 Pro with PPP?

No, Zenith15/25 cannot be upgraded to support PPP Services

5.6 Is Zenith40 compatible with SATEL UHF protocol?

Yes, Zenith40 has a SATEL radio incorporated – so all SATEL protocols are supported.

5.7 Can the new "Zenith Manager" PC SW/Android app connect to Zenith35 Pro?

No, this is currently not possible. For Zenith35/Pro you can use either the web-user interface or the field software (depending on SW) to configure the unit.

5.8 Can the new "Zenith Manager" PC SW/Android app connect to Zenith15/25 Pro?

The Zenith Manager has been designed for Zenith40. Some basic functions might also work when connecting with Zenith15/25. However, officially Zenith15/25 is not supported by Zenith Manager and no improvements will be made in this regard.

5.9 On which Windows OS version "Zenith Manager" is running?

All Version from Windows7 to Win10 are supported

5.10 Is the new Android app also available for Apple iOS?

No, currently only Android OS from V 4.2.2. onwards is supported.

5.11 Can I upgrade my Zenith40 5 Hz receivers to 20 Hz?

Yes, by uploading a license.

6 GeoMax Geo Office (GGO)

6.1 What to do if a newly installed GGO does not start with Window 8?

For GGO to correctly function on a Windows 8 PC, it is required to have version 3.5 of Microsoft.NET installed. To check if installed, start "Control Panel", "Programs and Features", "Turn Windows features on or off". Search the list for the entry

"Microsoft.NET Framework 3.5.x". If it's there, ensure that it is activated with a check mark. If this feature is not available, then download the installation files from Microsoft's website.

Once Microsoft.NET is activated or installed, the PC needs to be rebooted before attempting start GGO again.

6.2 From where do I get antenna dimensions required for post processing?

The complete details for the dimensions are stored as default in GGO. This can be viewed in the Antenna Management menu of GGO.

6.3 Is there a manual available for GGO?

A complete instruction manual for GGO is available from the GeoMax Partner Area. Alternatively, the online help within the GGO menu can be used.

6.4 Can I process BeiDou data with GGO 3.21(latest GGO version)?

No, processing of BeiDou data is not supported in GGO Version 3.21.

Please upgrade your GGO to the latest version 3.3, which supports the import of Zenith25 Pro data containing BeiDou records. Both MDB and RINEX3 import is supported.

For Zenith 20 the required record, containing BeiDou records the "*.dat file" converter to be integrated into GGO is not yet available. This is currently expected to be available by end of Q2 2015.

6.5 Why are there connecting lines once I import multiple data to GGO at once?

This is a known issue, which will be fixed in the future. Please import *.DAT and RINEX files one by one as a workaround.

6.6 Why do I get an offset in the final rover position when post processing?

Always check your base coordinates before post processing in GGO. If you know the base coordinates and you set the base as "Known" please check the height value and correct it before processing, if needed.

6.7 Is there a specific support of the Tilt&Go functionality?

No, the tilt values are not supported by GGO.

6.8 Why can't I see the quality information of the point and the baseline length values in imported *.dat files?

That information is not supported in the DAT file. Currently, this functionality is available only at Zenith15/25 Pro/40.